



FRD ACTIVITIES REPORT

January - March 2014



RESEARCH PROGRAMS

Project Sagebrush

Quality control and assurance analyses of the bag sampling and fast response tracer gas analyzer (TGA) tracer data sets for all tests was completed in the quarter. All of the data have been incorporated into the master database and flagged as appropriate. Comprehensive draft reports describing all sampling activities and QC procedures have been prepared for the bag sampling and TGA data for eventual inclusion as chapters in a formal report on Project Sagebrush. Analysis of tracer plume dispersion will be conducted in conjunction with the analysis of the measured turbulence and other meteorological data.

The Grid 3 tall tower near the tracer sampling array was heavily instrumented for Project Sagebrush with additional sonic anemometers provided by FRD, and an extensive package of turbulence and energy balance instrumentation provided by Washington State University (WSU), as well as with the routine suite of instrumentation used for mesonet purposes. Together these data will provide a detailed look at the vertical profiles of turbulence. All of the tower instrumentation will remain in place until June in an ongoing study of the structure of vertical turbulence in a wide range of meteorological conditions from late September to June. Ultimately the Grid 3 tower measurements will provide data for the Project Sagebrush tracer tests as well as a rich database for a separate comprehensive analysis of vertical turbulence structures over a broad range of conditions. Receipt of the WSU portion of the data is pending.

A preliminary consolidation and review of the Project Sagebrush meteorological measurements for the actual test days has been completed utilizing the data collected by FRD. A much more detailed and complete analysis of the meteorological data is pending acquisition of the data collected by WSU.

Rick Eckman made an oral presentation of "Project Sagebrush: Revisiting Short-range Dispersion Using Modern Instrumentation" at the 2014 American Meteorological Society Annual Meeting in Atlanta. The presentation gave an overview of the project together with some preliminary results from Phase 1 conducted in October 2013. (richard.eckman@noaa.gov, Kirk Clawson, Dennis Finn, and Roger Carter)

Birch Creek Valley Wind Flow Study

Analysis of the Birch Creek dataset during the previous reporting quarter focused on the monthly/seasonal changes in diurnal flow patterns, especially with respect to the interaction between mountain valley flows and flows on the Snake River Plain. A draft manuscript is currently in preparation that will describe these interactions and other effects of complex terrain. Preliminary results have provided several insights into the factors that affect the timing, duration, wind direction shifts, and potential disruptions to routine diurnal wind patterns across southeast Idaho. The current effort is focused on the summer season but later work could expand into the winter and spring months. A second

analysis of individual wind events featuring unusual flow patterns and abrupt temporal and/or spatial changes within a mountain valley (Birch Creek) is on hold pending availability of the higher spatial resolution datasets acquired by our partner, the USFS Fire Sciences Laboratory. It is anticipated that their data will be available within the next couple of months. Several potentially very interesting cases have been identified in the data presently available to us. (dennis.finn@noaa.gov, Jason Rich)

ARL Convective Initiation Project

The position for a postdoctoral associate who will be assisting in numerical modeling for the project was advertised through the Cooperative Institute for Climate & Satellites-Maryland during a one-month period spanning February and March. Eleven candidates applied for the position. Candidate interviews will take place in the third quarter. The associate will, in all likelihood, be located either in Idaho Falls or Oak Ridge.

Sub-domains of the High Resolution Rapid Refresh (HRRR) model output will shortly be made available for both the project's field study site in northern Alabama and for a region around Oak Ridge, Tennessee. The latter sub-domain will be used in instrument testing. Software is also under development to extract information from the model output that is relevant to convective initiation. Some of this software derives boundary-layer parameters using the Heated Condensation Framework, a concept put forth in a 2014 journal article. (richard.eckman@noaa.gov)

Wind Forecast Improvement Project (WFIP)

A poster entitled "A Probabilistic Method for the Estimation of Surface Roughness and Displacement Height Using Limited Wind Profile Information" by Rick Eckman, Dennis Finn, and Kirk Clawson was presented at the 2014 American Meteorological Society Annual Meeting. It described work stemming from the original WFIP study in Texas in 2011-2012. (richard.eckman@noaa.gov, Dennis Finn, Kirk Clawson)

NOAA and the Department of Energy are planning a WFIP2 project that will extend the research into complex terrain. The final location of the main field study for WFIP2 is still undecided. However, FRD has pointed out that over 200 wind turbines are located roughly 10 km east of Idaho Falls in complex terrain. Our existing Mesonet covers a large region just west of the turbines, and the observations could easily be extended eastward to cover the wind farms at relatively low cost. NOAA has accepted this concept as a potentially useful activity related to the WFIP2 program. FRD is developing plans to install research grade measurements---including flux systems, sodars, and a radar wind profiler---in the wind farms starting this summer. Discussions are already under way with the company operating one of the four wind farms in the region. The research plans are being closely coordinated with researchers at ESRL who are leading the WFIP2 activities within OAR. (richard.eckman@noaa.gov, Kirk Clawson)

INLViz, MDIFF, HYSPLIT, and Viz+

On September 1st Google will no longer allow the use of their mapping API for Adobe Flash. Because of this development, HyRAD (FRD's version of HYSPLIT for the Idaho National Laboratory) has been rewritten to use the Google Javascript mapping API. Functionally this version is very similar to the Flash version, but is now a desktop application instead of a browser based application. This is the same approach used to develop Viz+, FRD's mesonet data visualization tool. The new version of HyRAD can be downloaded and installed from the following URL: <http://www.noaa.inel.gov/hysplit/update>. (brad.reese@noaa.gov)

Tennessee Tracer Study

A meeting in Oak Ridge, Tennessee is planned for April 2014 to discuss the potential for a tracer study at a site near Oak Ridge where the Tennessee Valley Authority is planning to build modular nuclear reactors. One FRD staff member will attend the meeting. Back in the 1970s a fast breeder reactor was planned for this same site, but it was ultimately canceled. ARL conducted a tracer study at the breeder site back in the summer of 1974. A NOAA Technical Memorandum describing the study was published in 1976. That study focused on light winds and neutral to stable conditions within the boundary layer. Part of the discussion at the April meeting will be to review the old study and identify issues that might be addressed with a new study. (richard.eckman@noaa.gov, Kirk Clawson, Roger Carter, Donna Davis)

NOAA/IDAHO NATIONAL LABORATORY (INL) METEOROLOGICAL RESEARCH PARTNERSHIP

INL Tornadoes

A tornado and high wind climatology of the INL and southeastern Idaho was been prepared for and submitted to DOE-Idaho. The climatology was prepared in response to a tornado design basis inquiry. It was noted that 6 tornadoes have been reported on the INL since 1950. These have mostly been F0 category tornadoes, with one F1 tornado. Straight-line wind gusts in excess of 90 mph have been recorded by the NOAA/INL Mesonet four times since 1994 and were the result of thunderstorm outflow. Straight-line wind gusts that exceed the EF0 threshold of 65 mph are a more common occurrence than are tornadoes on the INL. For a beyond design basis extreme event, a EF4 tornado with a path length of 1.5 mi and an coverage area of 5.3 square miles can be assumed with a probability of 10^{-7} yr^{-1} . Jason Rich gave a formal presentation of the tornado climatology to DOE-ID management on February 5. (Kirk.Clawson@noaa.gov, Jason Rich, and Rick Eckman)

INL Dose Reconstruction

INL asked FRD to track down old records related to the Aircraft Nuclear Propulsion program that took place back in the 1950s and 60s. This program focused on developing a jet engine that used a nuclear reactor to generate thrust. Some of the engine tests that took place at what is now the INL Site resulted in significant radiological releases. These releases have been modeled as part of dose reconstruction projects related to employee compensation. The new request was related to a specific series of engine tests that took place in late 1957 and early 1958. It asked for any meteorological data from that period together with electronic files from dispersion model runs that were likely completed by FRD in the 1980s to simulate the dispersion from the engine tests. Meteorological data from two towers are still available in FRD's archives, but the old model runs were likely performed on Perkin-Elmer microcomputers that used tape drives. No electronic backups of the model runs were found. (richard.eckman@noaa.gov, Kirk Clawson, Roger Carter)

NOAA/INL Mesonet

The NOAA/INL Mesonet telemetry system continued to have radio interference problems during the months of January and February. On January 21, careful observations were made with a communications system analyzer of an interfering radio signal. A qualitative match was made with the signal and broadcasts from the radio at our Dubois mesonet station. It appeared that the radio was broadcasting outside of its time slot. The radio was replaced on January 22 and the interference pattern ceased. On February 6, Idaho Falls City Power was able to identify three potential sources of electric

noise near our offices. They replaced a lightning arrestor on the power pole directly in front of our office building. Apparently, the lightning arrestor was arcing and creating large amounts of radio frequency noise when air temperatures approach 0 °F. No radio interference has been observed since the replacement. (Shane.Beard@noaa.gov, Tom Strong, and Roger Carter)

A meeting was held with DOE-ID and USGS representatives on January 28 to discuss the electrical issues that have developed at the RWMC Mesonet station. DOE-ID is working on a plan to eliminate the problem. (Kirk.Clawson@noaa.gov and Rick Eckman)

ANSI/ANS-3.11 Standard-2005

The American National Standards Institute/American Nuclear Society standard entitled “Determining Meteorological Information and Nuclear Facilities,” first published in 2005, will sunset in 2015. As a result, the standard is being revised for a planned replacement at that time. The 3.11 standard has been adopted by DOE and it guides our meteorological activities in support of the NOAA/INL Meteorological Research Partnership. Kirk Clawson serves on the coauthor and reviewing teams. (Kirk.Clawson@noaa.gov)

Emergency Operations Center (EOC)

Team D participated in an EOC drill on 25 February. The drill centered on a fire at the Materials and Fuels Complex. Short term forecasts were provided. FRD’s dispersion model was not needed during this drill.

INL Hazardous Weather Alert System

Twelve hazardous weather statements were issued last quarter. Eleven out of the 12 alerts were issued because of high winds for which no warnings were issued by the Pocatello NWS. The 12th alert was issued for lightning as a thunderstorm moved over the INL. (Jason.Rich@noaa.gov)

OTHER ACTIVITIES

Safety

Employees took an Ergonomics Quiz at the March staff meeting.

February’s staff meeting included a safety YouTube video titled “Wasn’t Me”, which demonstrated that safety is everyone’s responsibility.

An on-line Fit and Health Back Pain Quiz was taken by all employees during January’s staff meeting.

Travel

Kirk Clawson and Richard Eckman traveled to Atlanta, GA for the annual AMS meeting February 2–6, 2014.

Training

Donna Davis participated in the GSA Disposal Solutions online training “Basics of Property Disposal” on February 27, 2014.

Also in February, Donna Davis completed an on-demand training on Reimbursable Agreements.

Donna Davis completed the required 40 Continuing Learning Points (CLPs) to obtain her FAC-COR Level I Recertification.

Outreach

Kirk Clawson, Jason Rich and Donna Davis attended the 11th Annual National Weather Service Spring Flood Outlook and Ground Hog Day Chili Cook Off. This was an opportunity to discuss spring flood outlook and snow pack updates with other agencies. It was also a time to see what emergency managers in our area are doing.

In January Rick Eckman answered another question as part of the Ask a Scientist program with the local newspaper in Idaho Falls. A local school class asked whether lightning comes in different colors.